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FOREST INSECT INVESTIGATIONS

REPORT  
OF  
THE MOUNTAIN PINE BEETLE SITUATION  
IN  
RAINIER NATIONAL PARK  
FALL 1930

By

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U. S. Bureau of Entomology

501 Lewis Bldg.  
Portland, Oreg.  
Nov. 15, 1930.



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## ABSTRACT

The protection of pines in Rainier National Park from destruction by insects is of importance in order to save representatives of these trees, even though they form a small percentage of the tree species and their loss would make no permanent hole in the forest cover.

Only white pines between 75 and 150 years of age and white bark pines are particularly susceptible to epidemics of the mountain pine beetle. Younger trees are not attacked and older trees usually form only a small percentage of the stand and do not support epidemics. The white pine stands occur more or less as isolated basins so that control can be considered independently for at least seven different Park areas.

The Longsire and White River areas are the most important from the Park standpoint and are the only ones where active epidemics in middle-aged white pine stands are now in progress. Control work should completely cover these areas during the spring of 1931 or the white pine stands are doomed to destruction.

It is estimated that there are 950 trees requiring treatment in the Longsire area and 450 trees in the White River area. A total allotment of \$ 3,000 is recommended for the spring control work of 1931.

Control methods consist of either peeling the bark or roasting the beetles in the bark by a new "barbecue" method. Peeling is probably the least expensive and can be used in the majority of cases.

Because of a number of advantages both entomological and administrative, it is recommended that hereafter most of the control work be done in the fall with a final spring clean-up.



REPORT OF  
MOUNTAIN PINE BEETLE SITUATION IN  
RAINIER NATIONAL PARK  
FALL 1930

The forests of Rainier National Park not only serve as a proper setting for the most outstanding scenic features - Mount Rainier and its glaciers, but are remarkable for their own intrinsic beauty and grandeur. As years go by and more and more of the virgin forests of the region fall under the axe, this primeval forest will become increasingly valuable as an example of Washington's original forest stands. The protection of these forests, then, from fire, insects and disease is of the utmost importance.

The bulk of the forest consists of hemlock, Douglas fir, true firs and western red cedar, all of which are fortunately quite free from barkbeetle attack. Only the pines and spruces are susceptible to heavy losses and these form only a small part of the forest cover. Nevertheless, their protection is important in order that representatives of these species may be preserved.

History of Infestation

The mountain pine beetle (Dendroctonus monticolae Hopk.) is an insect native to the forests of the Pacific Coast. Probably ever since these forests began these beetles have been active in them, periodically taking a heavy toll but never completely wiping out any tree species. During the period that these western forests have been under observation, we know that white pines have been the subject of repeated beetle attacks. The young pines are not susceptible, but when the trees reach about 75 to 150 years of age they become very attractive to the beetles and an outbreak can be expected. These epidemic outbreaks wipe out fully 95 per cent of the pine in the stands and leave only a few trees to reach maturity.



Foresters believe that these epidemics explain the presence of only one or two per cent of white pine found in the climax type.

Activity of the mountain pine beetle in Rainier National Park was noticed by Chief Ranger Barnett several years ago, and a small amount of clean up work has been carried on under his direction by the ranger force since 1927.

It was not until 1929, however, that the beetles seemed to be developing epidemic tendencies. At that time the situation was brought to the attention of the Bureau of Entomology and in the fall of that year, Mr. Daleon of the Coeur d'Alene station made an examination of the Park and recommended an allotment of \$500.00 for control purposes.

Work started in May of 1930 and continued into July. By the end of June it was apparent that the allotment was not adequate for a complete clean up. At Mr. Coffman's request the writer made an examination on July 2nd and 3rd and recommended the allotment of an additional \$300.00 to continue the work for another two weeks until the emergence of the beetles would necessarily bring it to an end.

During the latter part of October and early November of this year, the writer assisted by W. J. Buckhorn made an extensive examination of the white pine areas in the Park in order to formulate a control program for the coming year. The present report gives the results of this survey.

#### Extent and Location of Pine Stands

The forests of Rainier are found in the valleys at the lower elevations, extending from the Park boundaries up to 7,600 feet above sea level. These valleys are forested basins, separated from one another



at the upper levels by high barren ridges, and only joining on the lower slopes, often outside the Park.

White pine reaches its best development between 3000 feet and 3500 feet, but is also found overlapping the other types down to 2500 feet and up to 4500 feet. In only a few places is it found in pure stands, usually on old burns, but for the most part it occurs mixed with silver fir, noble fir, Douglas fir and hemlock. In fact in very few places would the loss of the white pine result in more than a temporary scar in the unbroken forest cover of the mountain slopes. Its protection then is mainly justified from the standpoint of preserving representative specimens of this tree in the Park flora.

The occurrence of white pine is so limited and the forested basins in which it is found so well isolated from one another that each of these forested basins may be considered independently of the others for insect control purposes. From the standpoint of insect control this is a very important point. Control in each area may be considered on its own merits. These independent control areas are indicated on the map attached to this report, and the following table gives a summary of the character and extent of the white pine stands within the Park.



Table No. 1.

Acreage of White Pine Stands  
Within Rainier National Park

Area	More than 50%	15% to 50%	Less than 15%	Total Acreage
	pine in stand less than 30 years of age	pine in stand 30 to 150 years of age	pine in stand more than 150 years of age	
1. Longsire	2,500	1,400	9,600	13,500
2. White River	300	1,600	8,100	8,000
3. West Side	200	—	9,800	10,000
4. Ohanapeconh	—	—	8,000	8,000
5. Carbon River	—	—	10,500	10,500
6. Cowlitz River	6,000	—	2,000	8,000
7. Wilderness Area	200	—	5,800	6,000
Total	9,200	3,000	51,800	64,000

White pine is usually one of the first trees to become reestablished in old burns, and for fifty years or more is apt to constitute more than fifty per cent of the second growth stand. During this period the trees are young, vigorous, and not susceptible to barkbeetle attack. As the above table shows there are about 9,200 acres of forest land within the Park on which this condition prevails. While such trees are very susceptible to blister rust, they can be disregarded from the barkbeetle standpoint.

As these second growth stands become older, other trees such as firs and hemlock gain a foothold and give the pine increasing competition for food and light. It is during this period when the pines are from 50 to 150 years of age that they are the most susceptible to barkbeetle attack, and it is in stands of this character that epidemics develop and spread. In the Rainier forests there are approximately 3,000 acres in which this condition exists and which must be closely watched for barkbeetle outbreaks.



After 150 years the stands of white pine have been so depleted by barkbeetle depredations that only a few representatives are left scattered among the firs and hemlocks which have now become the dominant species. Over 50,000 acres of the potential white pine area in the Park now contains only scattered trees, never exceeding 15 per cent of the total stand. While barkbeetles may continue to kill a few of these larger trees from time to time, such stands do not support aggressive epidemics. Furthermore, the loss of the pines in these mixed forests makes no serious hole in the forest cover and is of no great concern even from the Park standpoint. Since the acreage in which white pine occurs only as scattered groups or individual trees is very large, it is very questionable whether any money should be spent for their protection. Only around recreational areas and areas of intensive use would such protection seem justifiable.

In view of these considerations, there is therefore only about 3,000 acres within the Park which are seriously menaced by barkbeetles and require attention.

Taking the independent control areas up in order of their importance from the standpoint of recreational and aesthetic value to the Park, the present insect situation in each is as follows:

#### 1. Longmire Area

This area includes the forested slopes of the Nisqually River, Kautz Creek and Tahoma Creek. In the old burns such as the Silver Forest, top of Rampart Ridge, and Emerald Ridge, the white pines are less than fifty years old, are thrifty and not susceptible to barkbeetle outbreaks. On the point above Longmire, the slopes of Rampart Ridge, and the slopes



of Tuntum mountain, the pine is from 75 to 120 years of age, in mixture with other species, and is very susceptible to heavy beetle losses. In Tahomah and Fish Creek and throughout the remainder of the area, white pine only occurs as isolated mature trees which may be killed by the beetles from time to time but do not support the epidemics. The area of susceptible forest is approximately 1,400 acres.

Infested trees have been treated each year in this area by Chief Ranger Barnett since 1927. In the spring of 1930, 218 trees were cut on this area, and 90 trees left untreated according to his report. Most of these treated trees were located on the point north of Longacre. The present examination showed 25 trees had been left untreated on this point and 55 newly infested trees had developed nearby. Most of the untreated trees were left high up on Rempart Ridge and there are now several large groups of newly infested trees surrounding them. The new infestation occurs in large groups with no scattered infestation in between the groups. Groups examined had 55, 39, 99, 66, and 32 trees respectively per group. The rest of the stand appeared to be perfectly clean. If the beetles from these large groups are allowed to spread through the stand, in another year they will infest every portion of the area and as a result control work will be much more difficult and expensive. The writer estimates that at present there are 900 infested trees in this area.

## 2. White River Area

This area lies in the northeast corner of the Park and includes the basin of White River, Fryingpan Creek and the approaches to the newly opened Yakima Park. White pine, lodgepole pine, and whitebark pine com-



prise three valuable trees in this area and because of the new development here, special precautions should be taken to preserve these trees. There are approximately 1,600 acres of white pine, lodgepole pine, and whitebark pine susceptible to beetle damage within this area.

The infestation in this area is undoubtedly the result of the disturbance caused by the building of the new road into Yakima Park and the cutting of poles for construction purposes. All of the infestation on Sunrise Ridge is found along the highway and below the road. Trees below the road have been injured by blasting and sliding rocks and have fallen easy prey to the barkbeetles. These have multiplied in the weakened trees and spread to other timber not injured by the road work. One patch of "red tops" (trees killed last year) were found a quarter of a mile below the road but had been injured by a few large rocks blasted from the roadway above. Around these trees 77 newly infested trees were found, showing the very aggressive character of the infestation which has developed from these injured trees.

Besides white pine, on this area, lodgepole pine, whitebark pine and Engelmann spruce are being killed by the mountain pine beetles.

Because of the character of this infestation and the value of the pine stands in this area, control work is badly needed at this time. The writer estimates that there are 450 trees on this area requiring treatment.

### 3. West Side Area

Along the new west side highway on the drainage of the North and South Puysallup Rivers, there is a sprinkling of mature white pine from 100 to 200 years in age or over. In no place does it form any high



percentage of the stand, usually occurring as isolated mature trees or occasionally in small groups. While some loss of pines through beetle attack may occur in this area, it can hardly be considered a susceptible stand due to the scarcity of pine.

During the construction of the West Side Highway, enough injury to the trees was caused to bring about a concentration of beetle activity. As a result a number of trees were killed by the beetles below the bridge on the South Puallup. However, an examination at this time failed to reveal any fresh work and it is quite possible that this infestation has played out, due to the very scattered distribution of the white pines. Examination of the area next spring at the time of the control work is recommended but it is thought doubtful if many infested trees will be found.

Further north in the drainage of the Howich River, the cruisers for blister rust control, report 110 acres of mature white pine, 100-200 years old and representing not more than 15 per cent of the stand. No beetle infestation has been reported from this area, but it was not examined during the present survey.

#### 4. Chumpecoah Area

This taken in the forests of the southeastern corner of the Park and includes the drainage of Chinook Creek, and Chumpecoah River. White pine occurs singly and as scattered clumps of mature trees from the Park boundary for three miles up the river on both National Park and National Forest lands and as very scattered single trees through the rest of the basin.

This area was not examined by the writer due to the blocking of



the road by a bridge failure. Chief Ranger Barnett reports however, that the white pine consists of scattered mature trees, a few of which have been killed by the beetles. Outside of the Park on adjacent National Forest land, groups of 100 to 200 trees could be seen. During the spring 1930 control work, "all the visible infestation, consisting of 75 trees ranging in diameter from 16 to 36 inches, was cleared up".

Mr. M. C. Riley, in charge of the Blister Rust work in the Park reports that in this area, "White pine is mature, very defective, and the trees occur singly or in very small clumps widely scattered through the stand of fir and hemlock. The loss of these trees would hardly be noticeable when the whole stand is considered." Because of the excessive cost of blister rust control in this area, he recommends that nothing be done to protect the pines from the rust.

In view of the scattered distribution of the pine in this basin, the menace of adjacent National Forest infested timber, and the abandonment to blister rust, the writer questions the value of doing any more beetle control work in the area at the present time.

#### 5. Carbon River Area

This includes just the basin of the Carbon River and its tributaries. No susceptible white pine or barkbeetle infestation has been reported in this area. It was not examined during the present survey.

#### 6. Cowitz River Area

Most of the forests of this drainage were destroyed by a large fire many years ago. Of the 8,000 acres of potential white pine forest land, 8,000 acres were burned. On this old burn young white pines are coming back in many places. Mr. Riley reports that there are 1,350 acres



of forest on the Muddy Fork of the Cowlitz River in which white pine is important constituting 100 per cent of the stand and from 20 to 40 years old.

The remaining 2,000 acres is virgin forest in which white pine appears only as isolated mature trees, making up a very low percentage of the total stand.

None of this area can be considered as susceptible to barkbeetle epidemics. It was not examined during the present survey.

#### 7. Wilderness Area

This lies in the north central portion of the Park between Independence Ridge and the Sourdough Mountains, and includes the forested watershed of West Fork White River and Huckleberry Creek. No susceptible white pine nor infestation has been reported from this area, but it was not examined during the present survey.

Since on this area Nature's methods are to be given full play, it would not seem advisable to upset the natural succession of tree species by introducing artificial beetle control work to temporarily save the pine.

#### Estimate of Number of Trees Requiring Treatment

In Superintendent Tomlinson's report to the Director of the National Park Service dated October 13, 1930, he estimates the number of infested trees and the cost of treatment as follows:

	Number of Trees	Cost
Longlake Area	600	\$ 900
White River Area	900	1,450
West Side Area	400	500
Ohnapocosh Area	300	450
Total	2,200	\$3,300



The present survey indicates that while this estimate may be too high as to number of trees in some cases, the allotment asked for represents a safe working basis for the spring of 1931, and is certain to cover any possible contingency. Much of the infestation is very inaccessible and the cost of treatment will be necessarily high. Then too, at least two control camps will have to be put into operation, one at Longmire and the other at White River, and additional equipment will have to be purchased for these.

The estimate made by the writer during the present survey is as follows:

Area	Actual Count	Estimated No. of Trees	Control Cost.
Longmire	264	950	\$ 1,425
White River	<u>143</u>	<u>450</u>	<u>675</u>
		1400	\$ 2,100
Equipment needed for two camps at \$450 each			<u>900</u>
Total allotment needed			\$ 3,000

Control work is recommended only for the Longmire and White River areas. If any trees are found along the West Side Highway in the spring, they can be reached from the Longmire camp with little extra expense. For the present no work is recommended for the Ohauapogosh area because of the menace of National Forest infestation and the low values involved within the Park (scattered mature trees).

In order that a thorough clean-up of the Longmire and White River areas may be made, an allotment of \$3,000 is recommended to be available by April first 1931.



### Control Methods

The barkbeetle control methods in use in this Park consist of felling the trees and either peeling or burning the bark. On account of the density of the stand and the steepness of the slopes, Chief Ranger Barnett has devised a rather unique treating method. A spot is cleared or a pit dug and using the slash from the infested trees a fire is built. Across the fire two green skid-poles are laid parallel and at a distance of about three feet from each other. The infested tree trunks are cut into lengths of about four feet and slowly rolled down the skidway and over the fire. The beetles are "barbecued" in this manner. The method has the advantage of disposing of the slash and killing the beetles at the same time without creating a large fire such as would be the case if the logs were decked and burned. However, it is somewhat more expensive than peeling, but has distinct advantages under certain conditions.

The writer is of the opinion that the peeling method can be used to good advantage in most cases, with the subsequent burning of the slash so as to reduce the fire hazard created by the control operation. With this method it is thought that the cost of the work per tree can be considerably reduced, and the attractive influence of the burning avoided.

Sun-curing or burning trees standing in this Park are entirely out of the question. The sun-curing won't work at this latitude and the burning would be much too dangerous.

So far the control work has been done in the spring, as soon as the forest was accessible, but the writer is of the opinion that much more effective work can be done in the fall. During the latter part of October,



the trees begin to fade and a high percentage can be spotted. Treatment in the fall is directed against the beetles in the very immature stages so that the chances of survival are much less than in the spring. Many of the predators are saved and these concentrate upon the trees which have been missed. The woodpeckers also concentrate their winter feeding upon the missed trees and do very effective work. These and other entomological reasons explain why fall work is considered to be preferable. From the administration standpoint, fall work has much in its favor. Until the winter snows come, the areas are very accessible, and control work comes at a time when the press of other jobs is not particularly great. The greatest disadvantage is that the trees are much harder to peel in the fall. A final cleanup has to be made in the spring in any case.

The advantages of fall work can be summarized as follows:

1. More beetles destroyed by the peeling work.
2. Less predators destroyed.
3. Birds and predacious insects concentrate on the missed trees during the winter.
4. No attractive influences created by the work.
5. Areas easily accessible.
6. If burning of slash is done, there is less danger of fires holding over into the fire season.
7. Work comes at a relatively slack time.

The more important disadvantages are:

1. Trees more difficult to spot, requiring a final clean up in the spring.



2. Trees very hard to peel.

Taking these points into consideration, it is recommended that if any further control work is necessary following the spring 1931 clean-up, it be started in the fall of 1931 immediately following a survey of the situation, which should be conducted in September.

Portland, Oregon  
November 18, 1930

*F. P. Keen*  
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RAINIER NATIONAL PARK  
MOUNTAIN PINE BEETLE CONTROL PROJECT  
1930

White pine stands less than 50 years of age;  
not susceptible to beetle attack.

White pine stands 50-150 years of age;  
very susceptible to beetle attack.

Mixed stands with scattered white pine 160-300  
years of age; not subject to epidemic losses.

Areas covered with control Spring 1930

Epidemic areas of fall 1930

